



# National Primary Drinking Water Regulations

## Carbon tetrachloride

### CHEMICAL/ PHYSICAL PROPERTIES

CAS NUMBER: 56-23-5

COLOR/ FORM/ODOR: Colorless, clear, heavy liquid; sweet aromatic odor similar to chloroform

M.P.: -23° C B.P.: 76.54° C

VAPOR PRESSURE: 91.3 mm Hg at 20° C

DENSITY/SPEC. GRAV.: 1.59 at 20° C

### OCTANOL/WATER PARTITION (KOW):

Log Kow = 2.62 to 2.83

SOLUBILITIES: 1.2 g/L of water at 25° C

### SOIL SORPTION COEFFICIENT:

Koc = 71; moves readily through soil

### ODOR/TASTE THRESHOLDS:

Odor threshold in water is 0.52 mg/L

### HENRY'S LAW COEFFICIENT:

0.0304 atm-cu m/mole at 24.8° C

### BIOCONCENTRATION FACTOR (BCF):

Log BCF = 1.24 to 1.48 in fish;  
not significant

### TRADE NAMES/SYNONYMS: Perchloromethane;

Methane tetrachloride; Benzinoform;  
Univern; Necatorina; Facsiolin; Flukoids;  
R10 (refrigerant); Tetraform; Tetrasol;  
Freon 10; Halon 104

### DRINKING WATER STANDARDS

MCLG: zero

MCL: 0.005 mg/L

HAL: 1 day: 4 mg/L

10-day: 0.2 mg/L

Formerly used as dry cleaning agent and fire extinguisher, its production peaked in the USA in 1974. EPA regulation of fluorocarbon propellants will continue the trend in production cutback unless new applications are found for the chemical.

Its solvent uses include: solvent for rubber cement; cleaning agent for machinery and electrical equipment; for reducing fire hazard of grain fumigants; in soap perfumery and insecticides; in pharmaceuticals; for cable and semiconductor manufacture; as plasma etching gases for etching aluminum in integrated circuits; for oils, fats,

### HEALTH EFFECTS SUMMARY

**Acute:** EPA has found carbon tetrachloride to potentially cause liver kidney and lung damage when people are exposed to it in drinking water at levels above the MCL for relatively short periods of time.

Drinking water levels which are considered "safe" for short-term exposures: For a 10-kg (22 lb.) child consuming 1 liter of water per day: a one-day exposure of 4 mg/L; a ten-day exposure to 0.2 mg/L; upto a 7-year exposure to 0.07 mg/L.

**Chronic:** Carbon tetrachloride has the potential to cause liver damage from a lifetime exposure at levels above the MCL.

**Cancer:** There is some evidence that carbon tetrachloride has the potential to cause liver cancer from a lifetime exposure at levels above the MCL.

### USAGE PATTERNS

Production of carbon tetrachloride in 1988 was 761 million lbs; most of it is used for chemical synthesis of fluorocarbons and this has been declining at a rate of 7.9%/yr.

### TOXIC RELEASE INVENTORY -

#### RELEASES TO WATER AND LAND: 1987 TO 1993

	Water	Land
TOTALS (in pounds)	52,719	23,078

#### Top Releases by State\*

TX	22,922	75
WV	4	14,443
LA	7,720	2,213
AL	8,205	0
CA	20	2,400

#### Major Industries\*

Alkalies, chlorine	31,147	17,545
Inorganic chemicals	8,796	460
Petroleum refining	4,450	1,530
Misc. Indust. Organics	3,266	377
Agricultural chems.	817	2,400

\* Water/Land totals only include facilities with releases greater than a certain amount - usually 1000 to 10,000 lbs.

lacquers, varnishes, rubber waxes, resins.

In chemical manufacture its uses include: in polymer technology as reaction medium, catalyst; in synthesis of nylon-7 and other organic chlorination processes; in the formulation of petrol additives; in organic synthesis for chlorination of organic compounds; catalyst regeneration; a chemical intermediate for fluorocarbons

#### RELEASE PATTERNS

**In Soil:** Carbon tetrachloride occurs due to spills, runoff from agricultural sites, dumping, and through landfill leaching.

**In Surface Waters:** Carbon tetrachloride occurs as a result of industrial and agricultural activities, some may reach surface water through rainfall. Waste water from iron and steel manufacturing, foundries, metal finishing, paint and ink formulations, petroleum refining and non-ferrous metal manufacturing industries contain carbon tetrachloride.

**In Air:** The major source of carbon tetrachloride is industrial emission. The total nationwide emissions of carbon tetrachloride in 1978 from all sources was estimated at 65 million lb (4.5 million lb from production facilities). The primary source of these emissions is solvent uses.

From 1987 to 1993, according to the Toxic Release Inventory, carbon tetrachloride releases to water totalled nearly 53,000 lbs. Releases to land totalled over 23,000 lbs. These releases were primarily from chemical manufacturing industries which use it in chlorination processes. The largest releases occurred in Texas.

#### ENVIRONMENTAL FATE

In the troposphere, carbon tetrachloride is extremely stable (residence time of 30-50 years). The primary loss process is by escape to the stratosphere where it photolyzes. As a result of its emission into the atmosphere and slow degradation, the amount of carbon tetrachloride in the atmosphere has been increasing. Some carbon tetrachloride released to the atmosphere is expected to partition into the ocean.

In water systems, evaporation appears to be the most important removal process, although biodegradation may occur under aerobic and anaerobic conditions (limited data). Hydrolysis half-life in water is 7000 years at 25 deg C

Releases or spills on soil should result in rapid evaporation due to high vapor pressure and leaching in soil resulting in groundwater contamination due to its low adsorption to soil. A measured KOC of 71 was reported. Estimated retardation factor in breakthrough sampling in groundwater is 1.44 - 1.8. Carbon tetrachloride is ex-

pected to be highly mobile in soil and only slightly adsorbed to sediment.

Carbon tetrachloride has a low potential to bioconcentrate. Log of the bioconcentration factor in trout is 1.24, in bluegill sunfish - 1.48.

#### OTHER REGULATORY INFORMATION

##### MONITORING:

###### FOR GROUND/SURFACE WATER SOURCES:

INITIAL FREQUENCY- 4 quarterly samples every 3 years

REPEAT FREQUENCY- Annually after 1 year of no detection

TRIGGERS - Return to Initial Freq. if detect at > 0.0005 mg/L

##### ANALYSIS:

###### REFERENCE SOURCE

EPA 600/4-88-039

###### METHOD NUMBERS

502.2; 524.2; 551

##### TREATMENT:

###### BEST AVAILABLE TECHNOLOGIES

Granular Activated Charcoal and Packed Tower Aeration

##### FOR ADDITIONAL INFORMATION:

◆ EPA can provide further regulatory and other general information:

· EPA Safe Drinking Water Hotline - 800/426-4791

◆ Other sources of toxicological and environmental fate data include:

· Toxic Substance Control Act Information Line - 202/554-1404

· Toxics Release Inventory, National Library of Medicine - 301/496-6531

· Agency for Toxic Substances and Disease Registry - 404/639-6000